

A historical checklist of the orchid flora (Orchidaceae) of Quito, Ecuador

Martín Carrera^{1,2}, Luis Baquero³

¹ Wildlife Conservation Society – Ecuador Program, Quito, Ecuador

² Grupo de Investigación Dodson, Calle A #100 y Edmundo Carvajal, Quito 170510, Pichincha, Ecuador

³ Grupo de Investigación en Biodiversidad, Medio Ambiente y Salud (BIOMAS), Carrera de Ingeniería Agroindustrial, Facultad de Ingeniería y Ciencias Aplicadas, Universidad de Las Américas, UDLA, Vía a Nayón, Quito 170124, Ecuador

Corresponding author: Martín Carrea (martin-cl@hotmail.com)

Abstract. We compile a species inventory of orchid species collected at Quito, Ecuador, between 1790 and 2018 and compare it with the orchid species observed in the field between 2018 and 2021. Historical herbarium records include 52 orchid species in Quito. During our field campaigns, we found 29 of these previously collected species in herbaria and an additional 11 species which we newly report from Quito, bringing the total number of orchid species in Quito to 63 species. However, we were unable to find 23 species during our field campaigns. Our study shows that even in one of the largest Ecuadorian cities, several orchid species are still present, and among them, species not previously reported. Urgent conservation actions are needed in urban areas to preserve urban diversity and native ecosystems in Quito.

Key words. Species list, urban flora, urban impact, streams, Neotropics

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INTRODUCTION

The landscape of Quito, the capital of Ecuador, was unaltered by the first indigenous settlers but transformed into an urban settlement after the arrival of the Spanish colonizers in 1534 (Morales 2008). During the 19th century, city expansion led to the draining of natural lakes and introduction of invasive species like *Eucalyptus regnans* F. Muell., which were cultivated for timber purposes (Cuví 2005; EPMAPS 2011). During the 20th century, a considerable number of creeks that once meandered the city's central region were filled to accommodate the expanding urban footprint, leading to poorly planned neighbourhoods (Morales 2008; EPMAPS 2011). Over the last 30 years, the city has expanded without a coordinated city plan, enveloping former rural villages and causing irreparable damage to native ecosystems and waterways. These changes has resulted in continuing natural disasters in several neighbourhoods of the city (Duperier et al. 1995; Estacio and Jácome 2012; Pinos and Timbe 2020). Even with this historical alteration, remnants of native ecosystems are still present along the remaining creeks within the city (Oleas et al. 2016).

Unregulated urban expansion generated adverse impacts on the native ecosystems and their species, including the exceptionally diverse orchid family (Orchidaceae) (Jørgensen and León-Yáñez 1999). Orchids comprise a remarkable portion of the flora of Ecuador, accounting for approximately one in every five plant species in the country (Jørgensen and León-Yáñez 1999). This has earned Ecuador the title of “land of orchids”, having an estimated richness of over 4,032 orchid species (Jørgensen and León-Yáñez 1999; Dressler 2005; Salazar 2005; Ulloa and Neill 2005; Neill and Ulloa 2011; Akhalkatsi et al. 2014; Christenhusz and Byng 2016).

Historical records show that orchid research and exploration in Ecuador date back to 1790 with Thadäus Haenke. Later, Alexander von Humboldt and Bonpland made further contributions documented in “Flora Quitensis” in 1803 (Carrión 2007; Ruales and Guevara 2010). The 20th and 21st century witnessed significant contributions in Ecuador in orchid taxonomy and systematics, with contributions from Rudolf Schlechter, Gunnar Harling, Sparre Benkt, Leslie Garay, Calaway H. Dodson, Carlyle A. Luer, Eric Hágsater, Alezander Hirtz, and Gerardo Salazar among other prominent researchers who specifically explored Quito (Schlechter 1921; Dodson 1994, 2001, 2002, 2003; Dodson and Dodson 1980, 1982, 1984, 1989; Dodson and Escobar 1993; Dodson and Gentry 1978; Dodson and Luer 2010, 2011; Dodson and Vásquez 1989; Carrión 2007; Hágsater 1993, 2001, 2006, 2009; Jørgensen and León-Yáñez 1999; Luer 1975, 1976, 1978, 1979, 1986, 1990, 1991, 1994, 1996, 1998; Ossenbach and Jenny 2021).

Regrettably, the ecosystems of Ecuador suffer the highest rate of deforestation in South America (FAO 2014), and endemic plant species are at risk, with 4,500 species classified as Endangered. Among the orchid species, 1,455 are threatened by the effects of habitat loss, illegal harvesting, invasive species, and global



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change (Seaton et al. 2010; León-Yáñez et al. 2011; Hinsley et al. 2017; Tejeda-Sartorius et al. 2017; Wraith and Pickering 2019). Due to their complex interactions with mycorrhizae and pollinators, orchids are valuable indicators of ecosystem health and offer a chance to study the impacts of urban development in biodiverse regions (Akhalkatsi et al. 2014).

Despite the history of orchid research within Quito, a new species was surprisingly discovered along a creek in 2018, showing that the orchid diversity of Quito is not fully known, and that poor city planning threatens unique ecosystems where orchids still exist (Carrera et al. 2018). Our study aims to produce a checklist of historical and contemporary orchid species within the city of Quito. To achieve this, we compiled a list of species from existing records in databases and herbaria of specimens collected between 1790 and 2018, and we collected photographic vouchers of orchids during our field campaigns between 2018 and 2021.

Given the significance of orchids as a charismatic and umbrella family, the insights gained from this research will have implications for the future conservation strategies for the remaining green areas, such as along creeks, in the city of Quito (Akhalkatsi et al. 2014).

STUDY AREA

Our study area is inside the Distrito Metropolitano de Quito (DMQ; in English, Quito Metropolitan District) and Cantón Rumiñahui, which together cover around 4150 km² of urban and rural areas. We are not including the entire DMQ and Cantón Rumiñahui in our study area. We only include the compact urban area of the city of Quito, which nowadays includes previously isolated villages like Nayón, San Antonio de Pichincha, Calderón, Carapungo, Chillogallo, Tumbaco valley, and Los Chillos valley. Quito and these villages have become a single dense urban agglomeration (Morales 2008; Villacis and Marrero 2017) (Figure 1).

Our study area covers approximately 893 km² and is at elevations between 2,000 and 3,150 m. The average temperature and rainfall in our study area is 15 °C and 2,000 mm per year, respectively (Sierra 1999). The southern limits of the study area are near the Tambillo and slopes of Mount Atacazo and includes “páramo” (high-altitude shrubland and wetland found in the high Andes); these areas are threatened by future urban expansion (Salazar et al. 2020). The northern limits of the study area is in San Antonio de Pichincha, which has mostly dry Andean forests and is near the Pululahua Geobotanical Reserve (Sierra 1999). We did not sample inside the reserve because it lies beyond the boundaries of the city of Quito. To the east, we sampled in Tumbaco Valley dry forest, and in Los Chillos Valley in the southeast (Sierra 1999). The western limit of the study area is the slopes of the Pichincha volcano, which includes montane forest and “páramo”. Our study area includes remnants of Quito’s native vegetation; these are isolated and mainly along creeks within the city and in metropolitan parks (Sierra 1999; Villacis and Marrero 2017).

METHODS

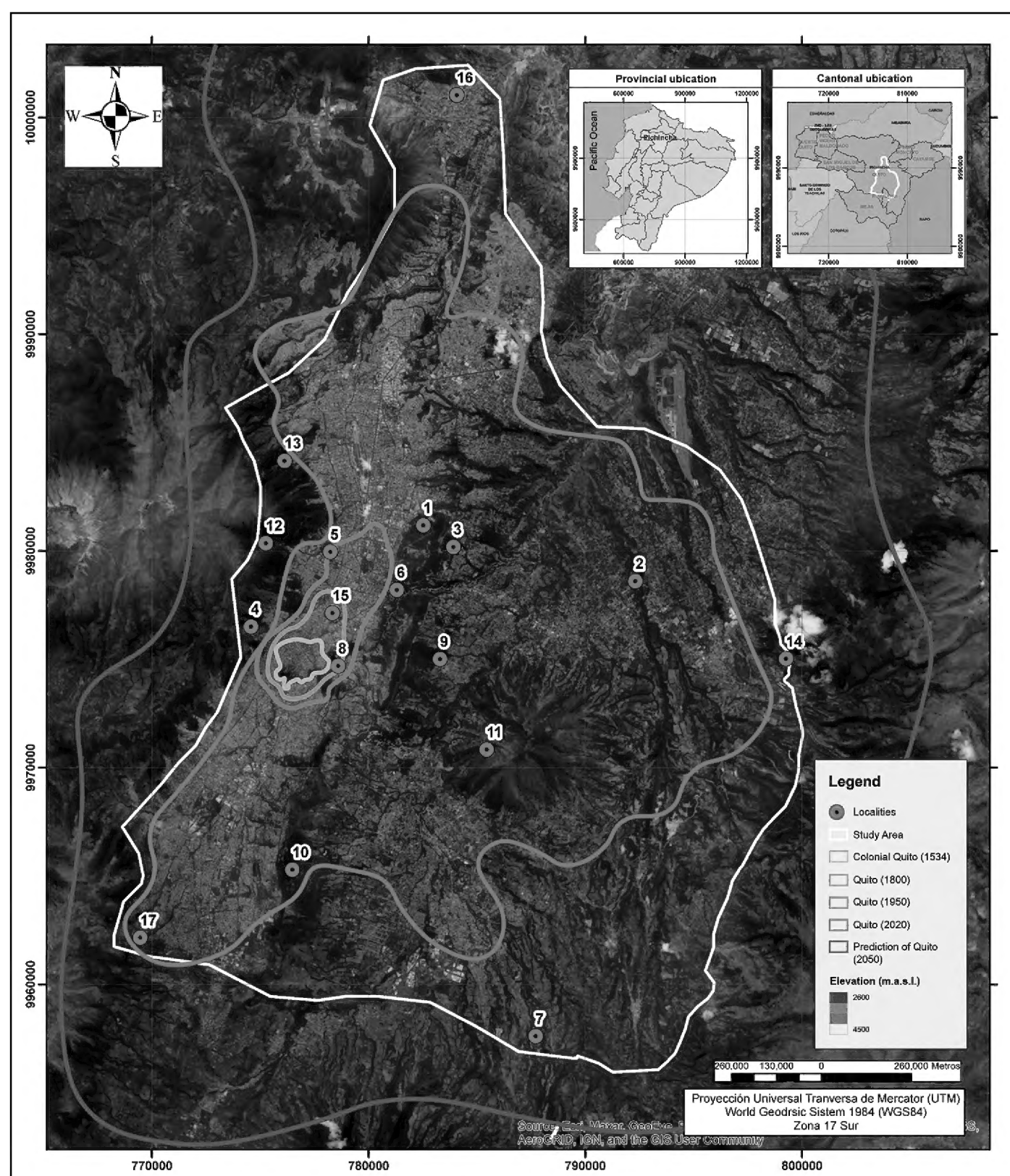
Herbaria and MOBOT revision. We accessed all records of orchids in the main herbaria of Quito in 2017–2018. These were the Herbario Nacional del Ecuador (QCNE), Herbario de la Universidad Católica del Ecuador (QCA), Herbario de Botánica Económica de la Universidad San Francisco de Quito (QUSF), Herbario de la Universidad Central del Ecuador (QCA), and Biblioteca Aurelio Espinosa Pólit (QPLS). We only included specimens identified to species with having precise a location within our study area. We developed a list of orchid species collected between 1790 and 2018 in our study area, and the conservation status of each species was included (TROPICOS 2015). Between 2018 and 2021, we made occasional visits to the main herbaria of Quito, in case there were new records of orchids inside our study area.

Field campaigns. Between 2018 and 2021, we sampled 17 sites in our study area: Parque Metropolitano Guangüiltagua, Chiche River, Nayón Creek, La Chorrera, Parque Arqueológico Rumpibamba, Parque Guápulo, Pita River, Machángara River, Lumbisi Creek, Parque Metropolitano del Sur, Ilaló Creek, Rumipamba Creek, San Carlos Creek, Pifo Creek, Parque El Ejido, San Antonio de Pichincha, and Atacazo Creek (Figure 1). At all these sites, direct or indirect effects of urbanization were apparent.

Our sites were chosen based on historical records and the occurrence of small green areas such as along creeks. Each site was visited by a minimum of two observers every four months over four years. Each field campaign lasted approximately four hours, resulting in 204 field campaigns with approximately 816 hours of field observation. Sites were visited in different months so that fertile plants could be seen. We used opportunistic sampling. Terrestrial orchids were searched for on the ground, and epiphytic orchids, in trees and on rocks, hillsides, and fallen tree branches (Saavedra and Pitogo 2021).

At each site, we recorded all orchids found and identified them using original species descriptions and identification keys (Schlechter 1921; Dodson 1994, 2001, 2002, 2003; Dodson and Dodson 1980, 1982, 1984, 1989; Dodson and Escobar 1993; Dodson and Gentry 1978; Dodson and Luer 2010, 2011; Dodson and Vásquez 1989; Carrión 2007; Hágsater 1993, 2001, 2006, 2009; Jørgensen and León-Yáñez 1999; Luer 1975, 1976, 1978, 1979, 1986, 1990, 1991, 1994, 1996, 1998; Ossenbach and Jenny 2021). Apart from the original descriptions, important information for species identification was gathered from herbarium records and online repositories such as Epidendra: The Global Orchid Taxonomy Network; Global Biodiversity Index System (GBIF) and

Figure 1. Historical growth of the urban area of the city of Quito since 1534 and including the future prediction to 2050 (Morales, 2008; EPMAPS, 2011; Salazar et al. 2020). White polygon = study area; green circles = sites surveyed. 1 = Parque Metropolitano Guangüiltagua 2 = Chiche River. 3 = Nayón Creek 4 = La Chorrera. 5 = Parque Arqueológico Rumpibamba. 6 = Parque Guápulo. 7 = Pita River. 8 = Machángara River. 9 = Lumbisí Creek. 10 = Parque Metropolitano del Sur. 11 = Ilaló Creek. 12 = Rumipamba Creek. 13 = San Carlos Creek. 14 = Pifo Creek. 15 = Parque El Ejido. 16 = San Antonio de Pichincha. 17 = Atacazo Creek.



the Internet Orchid Species Photo Encyclopedia (IOSPE) (GBIF 2022; IOSPE 2022; Epidendra 2025). We use the most up-to-date name for each species from the International Plant Names Index (IPNI 2022), Epidendra (2025), and Tropicos (2015). We developed a list of orchid species found during our field campaigns, with notes on abundance, habit and ecology, phenology, and conservation status (Tropicos 2015)

Taxonomic treatment. Classical botanical collections are essential for taxonomical identification and future reference in herbaria (Funk et al. 2018). Nevertheless, new technologies arise, and modern collections have adopted the use of photography vouchers which offer unique insights missed in traditional collections (Funk et al. 2018; Mesaglio et al. 2023). Photographic records, such as on citizen-science platforms like iNaturalist, enable researchers to reliably identify species using apps like PlantSnap and Merlin; these apps use machine learning and artificial intelligence to recognize species (Heberling and Isaac 2018; Wäldchen and Mäder 2018; Gómez Bellver et al. 2020; Greene et al. 2023; Mesaglio et al. 2023; Merlin 2022; PlantSnap 2022; Hart et al. 2023; iNaturalist 2023). Photographic vouchers also reinforce conservation efforts of threatened species and populations by replacing lethal specimen-collection (Donegan 2008; Minter et al. 2014; Saavedra and Pitogo 2021; Greene et al. 2023; Mesaglio et al. 2023).

We made preliminary observations of several threatened and rare orchid populations in our study. Following the methodologies of Saavedra and Pitogo (2021) and Montoya-López and Lehnert (2024) and using only photographic vouchers, no samples were collected during our study. The decision to not collect voucher specimens follows the policy of the journal (Check List 2023) and adapts to regional regulations issued by the environmental office of Ecuador (Ministerio del Ambiente Agua y Transición Ecológica del Ecuador) under the research permit MAATE-DBI-CM-2021-0187.

Fertile specimens were photographed using a Samsung S5 Mini with a macro lens adaptor.

We identified species from our photographs, with additional confirmation of renowned specialists of various groups: Eric Hágsater for *Epidendrum* L., Gerardo Salazar for terrestrial orchids, and Mark Wilson for Pleurothallidinae Lindl. ex G. Don. Marcia Peñafiel verified the identifications before deposition of the photographic vouchers in Herbario Nacional del Ecuador (QCNE).

RESULTS

We found records of 52 orchid species in herbaria and databases, registered between 1790 and 2018 in the study area. In our fieldwork we found 40 species (Figures 2–5). Of these 40 species, 29 species are known from historical records in herbaria. Surprisingly, we found 11 species for the first time in Quito. Thus, the total number of species recorded in Quito is 63. We did not find any unreported species in our study of herbarium specimens.

The 63 orchid species are part of 10 subtribes; the most diverse are Pleurothallidinae and Laeliinae Benth. (14 species each), followed by Cranichidinae Lindl. ex Meisn. (10) and Elleanthinae Szlach. (9), Spiranthinae Lindl. ex Meisn. (5), Oncidiinae Benth. (4), Malaxidinae Benth. & Hook. f (3), Maxillariinae Benth. (2), Goveniinae Dressler and Pachyphyllinae Pfitzer (1 species each). These 63 species are distributed across 26 genera, the most diverse is *Epidendrum* (14), followed by *Elleanthus* C. Presl (8), *Stelis* Sw. (5), *Pleurothallis* R. Br. (4), *Lepanthes* Sw. and *Cyclopogon* C. Presl (3 species each), *Aa* Rchb. f., *Altensteinia* Kunth, *Cranichis* Sw., *Malaxis* Sol. ex Sw., *Ponthieva* R. Br., and *Maxillaria* Ruiz & Pav. (2 species each), and *Pterichis* Lindl., *Govenia* Lindl., *Caucaea* Schltr., *Cyrtochilum* Kunth, *Pleurothallopsis* Porto & Brade, *Stenorrhynchos* Rich. ex Spreng., *Oncidium* Sw., *Anathallis* Barb. Rodr., *Pelexia* Poit. ex Lindl., *Gomphichis* Lindl., *Sertifera* Lindl. & Rchb. f., *Liparis* Rich., *Telipogon* Kunth, and *Pachyphyllum* Kunth (1 species each).

Among the species in our list, *Cyclopogon pululahuanus* is Endangered and *Anathallis lasioglossa* is Vulnerable in the IUCN Red List (León-Yáñez et al. 2011; Tropicos 2015). Additionally, two are Near Threatened, six are of Least Concern, one is Data Deficient, and 52 orchid species are Not Evaluated. Additionally, 58 species are listed in CITES II.

The checklist is divided into two parts: (1) orchid species recorded historically and found during our field campaigns (29 species), and (2) orchid species newly reported from our study area for the first time (11 species). In the list, a species is classified as “Abundant” if it was found in several sites and with several individuals at each site, “Frequent” if found in only some sites and with few individuals, “Rare” if found only in one site and with fewer than 10 individuals.

Orchid species historically recorded and found during our field campaigns

Subtribe Cranichidinae Lindl.

***Aa maderoi* Schltr. (1920)**

Figure 2A

Material examined. ECUADOR – PICHINCHA • Atacazo Creek; 00°19'13"S, 078°34'45"W; 3100 m alt.; 24.III.2018; Luis Baquero & Martín Carrera 01 leg.; QCNE 269826.

Identification. Medium-sized terrestrial plant with upright lanceolate to ligulate basal leaves bearing pointed tips and petiolate bases. Cylindrical inflorescence up to 40 cm long, adorned with numerous white flowers surrounded by thin, brownish, pointed bracts (Garay 1978).

Remarks. Abundance: rare.

Habit and ecology: on rocks covered with moss along small streams.

Phenology: blooms in March.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Altensteinia fimbriata* Kunth (1816)**

Figure 2B

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'57"S, 078°27'54"W; 2800 m alt.; 15.V.2018; Luis Baquero & Martín Carrera 02 leg.; QCNE 269851.

Identification. Robust terrestrial with spirally arranged lanceolate leaves. Terminal inflorescence forming an erect raceme resembling a bottle brush, measuring 37.5 cm long and adorned with numerous basal bracts. Greenish flowers with ciliate labellum (Garay 1978).

Remarks. Abundance: abundant.

Other localities: San Carlos Creek, Chiche River, and Atacazo Creek.

Habit and ecology: in intervened areas like *Eucalyptus* spp. forests and in dry areas, also occur in non-intervened forests with native vegetation. Pollinated by moths (Carrera & Baquero 2024).

Phenology: blooms in May.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Altensteinia virescens* Lindl. (1845)**

Figure 2C

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 18.IV.2019; Luis Baquero & Martín Carrera 03 leg.; QCNE 269852.

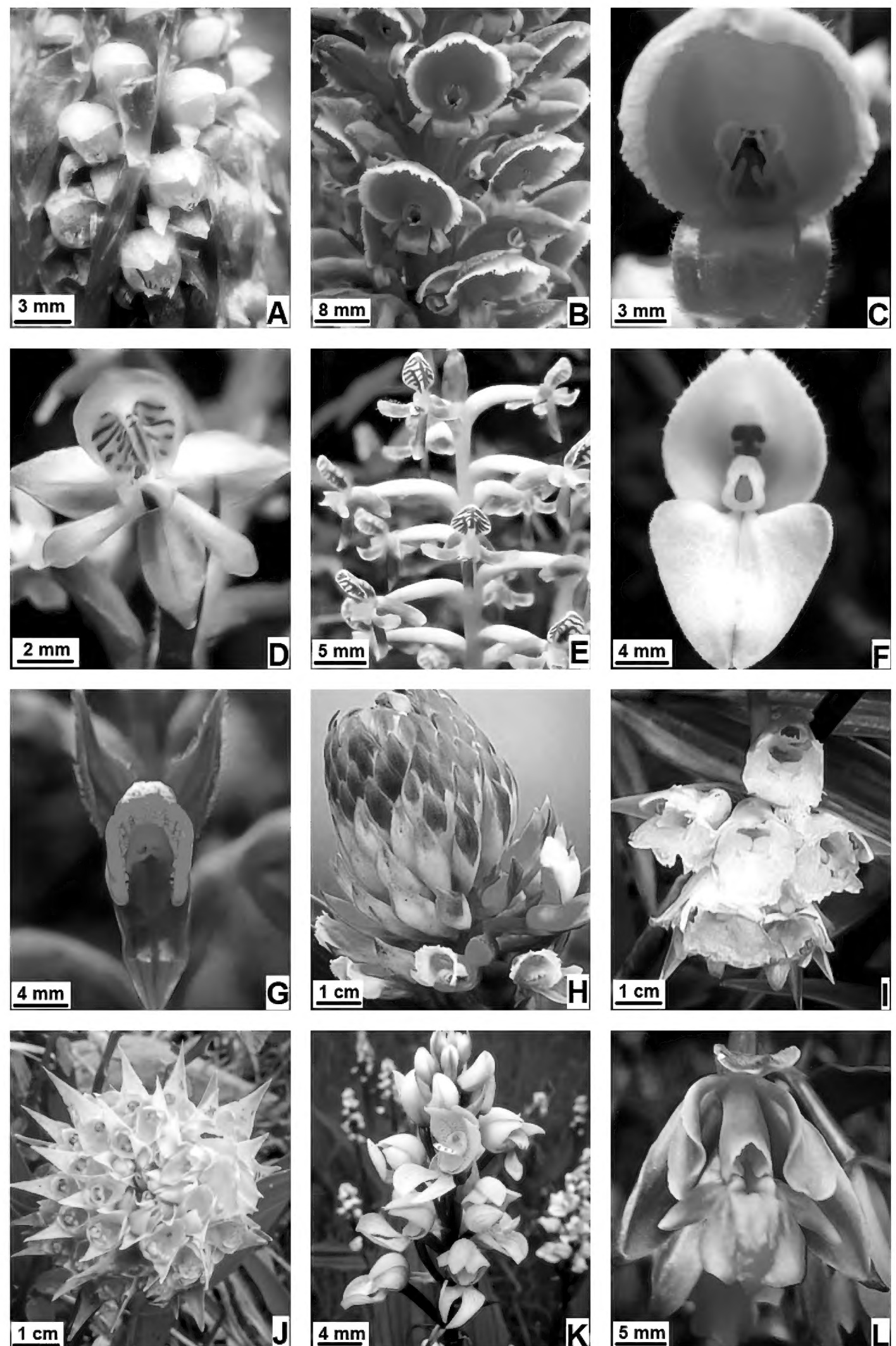


Figure 2. Orchids of Quito. **A.** *Aa maderoi* Schltr. **B.** *Altensteinia fimbriata* Kunth. **C.** *Altensteinia virescens* Lindl. **D.** *Cranichis antioquiensis* Schltr. **E.** *Cranichis picta* Rchb. f. **F.** *Ponthieva pseudoracemosa* Garay. **G.** *Pterichis triloba* (Lindl.) Schltr. **H.** *Elleanthus myrosmatis* Rchb.f. **I.** *Elleanthus petrogeiton* Schltr. **J.** *Elleanthus sodiroi* Schltr. **K.** *Govenia tingens* Poepp. & Endl. **L.** *Epidendrum angeloglossum* Hágsater & Dodson.

Identification. Small to medium-sized terrestrial orchid. Short, erect stem, branching at the base, supporting a rosette of leathery, narrowly obovate leaves. Dense, many-flowered inflorescence measuring approximately 20 cm in length, held upright at the terminal. Greenish flowers (Garay 1978).

Remarks. Abundance: rare.

Habit and ecology: on vertical moist rocks covered by moss near small waterfalls.

Phenology: blooms in April.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Cranichis antioquiensis* Schltr. (1920)**

Figure 2D

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 23.III.2019; Luis Baquero & Martín Carrera 04 leg.; QCNE 269850.

Identification. Medium-sized terrestrial orchid; basal leaves 1–2, ovate, slightly pointed, and tapering towards petiolate base. Flowers on a thick, erect, terminal inflorescence 8–10 cm long, densely packed with numerous white-green flowers (Garay 1978).

Remarks. Abundance: abundant.

Other localities: Parque Metropolitano Guangüiltagua, Parque Metropolitano del Sur, Lumbisí Creek, and Ilaló Creek.

Habit and ecology: various types of ecosystems, including dry soil inside *Eucalyptus* spp. forests and rocks covered with moss along small creeks with only native vegetation.

Phenology: blooms in March.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Cranichis picta* Rchb. f. (1876)**

Figure 2E

Material examined. ECUADOR – **Pichincha** • Pita River; 00°09'58"S, 078°27'54"W; 2800 m alt.; 16.IV.2018; Luis Baquero & Martín Carrera 05 leg.; QCNE 269849.

Identification. Miniature terrestrial orchid, with narrow, elongate leaves and a 30 cm tall, densely flowered racemose inflorescence. Ovate-lanceolate floral bracts, a smooth ovary, and a distinct membranous lip margin. White flowers (Garay 1978).

Remarks. Abundance: rare.

Habit and ecology: in humid areas with muddy grounds, always near *Blechnum* spp. ferns.

Phenology: blooms in April.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Pterichis triloba* (Lindl.) Schltr. (1911)**

Figure 2G

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 17.IV.2018; Luis Baquero & Martín Carrera 07 leg.; QCNE 269847.

Identification. Small to medium-sized terrestrial or lithophytic orchid with solitary or occasionally two oblong-elliptical basal leaves with acute to subacute tips, narrowing into a petiolate base. Terminal inflorescence up to 14 cm long, with 20 flowers. Inflorescence typically sparsely hairy. Orange flowers (Garay 1978).

Remarks. Abundance: rare.

Habit and ecology: on vertical rocks covered with moss and near the roots of various tree species.

Phenology: blooms in April.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Elleanthinae Szlach.

***Elleanthus myrosmatis* Rchb. f. (1862)**

Figure 2H

Material examined. ECUADOR – PICHINCHA • San Antonio de Pichincha; 00°00'40"N, 078°27'21"W; 2700 m alt.; 20.IV.2018; Luis Baquero & Martín Carrera 09 leg.; QCNE 269845.

Identification. Medium-sized to large terrestrial orchid. Stout, compressed stem with lanceolate-elliptical to ovate-lanceolate, pointed leaves that taper into a sessile base. Inflorescence terminal, cone-shaped, 9 cm long, densely packed with many flowers. Flowers orange and red (Dodson and Luer 2010).

Remarks. Abundance: rare.

Habit and ecology: on rocky ground with moss near cliffs.

Phenology: blooms in April.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Elleanthus petrogeiton* Schltr. (1921)**

Figure 2I

Material examined. ECUADOR – PICHINCHA • La Chorrera; 00°12'08"S, 078°31'39"W; 2850 m alt.; 05.II.2018; Luis Baquero & Martín Carrera 08 leg.; QCNE 269846.

Identification. Medium-sized to giant, cold growing, terrestrial with no pseudobulbs. Basal leaves erect, elliptical-ovate, plicate, 7-nerved. Inflorescence erect, terminal, 5–6 cm long, several-flowered, with erect-patent, acuminate floral bracts that surpass flowers in length. Flowers white or cream (Garay 1978).

Remarks. Abundance: frequent.

Habit and ecology: on humid rocks covered by moss and always along rivers. This species can be seen with *Stelis*

argentata, *S. pulchella*, and *Pleurothallis quitu-cara*.

Phenology: blooms in February.

Conservation status: CITES: Appendix II; IUCN Red List: Least Concern.

***Elleanthus sodiroi* Schltr. (1916)**

Figure 2J

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09′58″S, 078°27′54″W; 2800 m alt.; 14.I.2018; Luis Baquero & Martín Carrera 10 leg.; QCNE 269843.

Identification. Large terrestrial orchid with erect canes, with 7–10 leathery, lanceolate leaves. Flowers densely packed on a terminal, racemose inflorescence, each flower subtended by elliptical, hyaline-margined bracts twice as long as ovary (Dodson 2001).

Remarks. Abundance: abundant.

Other localities: Lumbisi Creek, Nayón creek, and Ilaló Creek.

Habit and ecology: in dry areas near *Byttneria ovata* Lam. and *Epidendrum jamiesonis* Rchb.f.. This species is mainly located inside creeks with native vegetation but close to *Eucalyptus* spp. forest as well.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Near Threatened.

Subtribe Goveniinae Dressler

***Govenia tingens* Poepp. & Endl. (1936)**

Figure 2K

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09′58″S, 078°27′54″W; 2800 m alt.; 11.I.2018; Luis Baquero & Martín Carrera 11 leg.; QCNE 269859.

Identification. Large terrestrial orchid, with corm-like pseudobulb from which an elongated stem emerges. Leaves two, subopposite, oblong-elliptical, tapering to a short petiole. Inflorescence terminal, loosely racemose, up to 60 cm long, adorned with several to many flowers and accompanied by 1–3 distant tubular bracts. Flowers pink (Dodson 2001).

Remarks. Abundance: abundant.

Other localities: Parque Metropolitano del Sur, La Chorrera, and Pita River.

Habit and ecology: mainly in *Eucalyptus* spp. forests in dry areas covered with grass, growing near *Altensteinia fimbriata*.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Laeliinae Benth.

***Epidendrum brevivenium* Lindl. (1853)**

Figure 3A

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22′56″S, 078°24′41″W; 3000 m alt.; 07.II.2020; Luis Baquero & Martín Carrera 13 leg.; QCNE 269820.

Identification. Small to medium-sized, cold-growing plant, epiphytic or terrestrial. Stems scandent, extensively branched stems, with 5–7 narrowly elliptical, obtuse to rounded leaves. Flowers arranged in a dense, several-flowered inflorescence about 6 cm long, including a 3 cm long peduncle. Flowers white (Dodson and Dodson 1989).

Remarks. Abundance: frequent.

Other localities: Rumipamba Creek and Ilaló Creek.

Habit and ecology: along creeks on various species of native trees.

Phenology: blooms in February.

Conservation status: CITES: Appendix II; IUCN Red List: Least Concern.

***Epidendrum aff. geminiflorum* Kunth (1816)**

Figure 3B

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09′58″S, 078°27′54″W; 2800 m alt.; 22.XII.2019; Luis Baquero & Martín Carrera 14 leg.; QCNE 269823.

Identification. Similar to *Epidendrum gaminiflorum* (Eric Hágsater pers. comm.), but further examination of general morphology, habit, and distribution is needed to confirm this is a separate species or subspecies. Epiphyte or terrestrial. Stem short, cane-like, typically producing 2–4 flexible, oblong leaves. Terminal inflo-

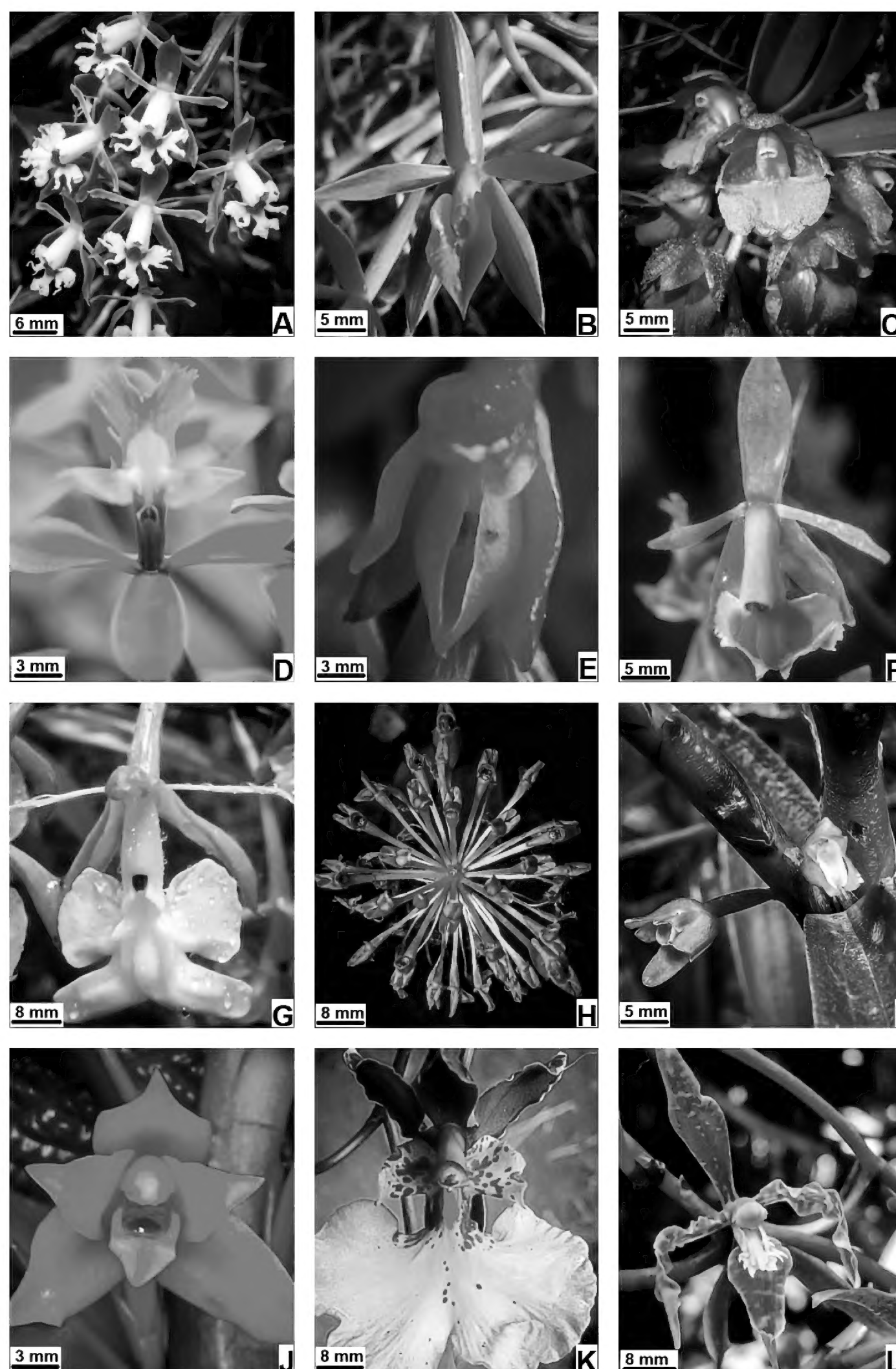


Figure 3. Orchids of Quito. **A.** *Epidendrum brevivium* Lindl. **B.** *Epidendrum* aff. *geminiflorum* Kunth. **C.** *Epidendrum gratissimum* (Rchb. f.) Hágsater & Dodson. **D.** *Epidendrum jamiesonis* Rchb. f. **E.** *Epidendrum orthocaulis* Schltr. **F.** *Epidendrum penlandii* L. O. Williams. **G.** *Epidendrum porphyreum* Lindl. **H.** *Malaxis andicola* Kuntze. **I.** *Maxillaria aggregata* Lindl. **J.** *Maxillaria longibracteata* Rchb. f. **K.** *Caucaea dodsoniana* Szlach. & Kolan. **L.** *Cyrtochilum angustatum* (Lindl.) Dalström.

rescence with a peduncle measuring 1.5–2.4 cm long, hidden within a sheath. Flowers, non-resupinate, green becoming ochre-yellow when mature (Dodson and Dodson 1980).

Remarks. Abundance: rare.

Habit and ecology: along streams with native vegetation and a few *Eucalyptus* spp. trees.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Epidendrum gratissimum* (Rchb. f.) Hágsater & Dodson (1992)**

Figure 3C

Material examined. ECUADOR – PICHINCHA • La Chorrera; 00°12′08″S, 078°31′39″W; 2850 m alt.; 07.I.2020; Luis Baquero & Martín Carrera 15 leg.; QCNE 269822.

Identification. Small to large, epiphyte or terrestrial orchid. Mature, straight main stem longer than its

branches. Leaves lanceolate to narrowly lanceolate, bilobed, with margin entire and a minute dorsal keel. Inflorescence terminal, nodding, racemose, with 15–22 reddish-yellow flowers (Hágsater 2006).

Remarks. Abundance: frequent.

Other localities: Rumipamba Creek.

Habit and ecology: hanging in the forest canopy, on several tree species along several creeks.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Epidendrum jamiesonis* Rchb. f. (1856)**

Figure 3D

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 10.V.2018; Luis Baquero & Martín Carrera 16 leg.; QCNE 269821.

Identification. Large, epiphytic orchid. Stems numerous simple, cylindrical, with oblong-elliptical, bilobed, spreading leaves. Inflorescence with a raceme of flowers. Flowers not twisted upon opening, with a lip with a complex, fleshy callus. Flowers purple to pink (Jørgensen and Ulloa Ulloa 1994).

Remarks. Abundance: abundant.

Other localities: Nayón Creek, Chiche River, San Antonio de Pichincha, Rumipamba Creek, Pifo Creek, Machángara River, La Chorrera, Lumbisí Creek, and Parque Metropolitano Sur.

Habit and ecology: prefers dry areas and found in dry rocks in non-intervened areas with *Elleanthus sodiroi* and *Stelis pulchella* Kunth; also in grass and *Eucalyptus* spp. forests far away from creeks. This species is cultivated but can appear naturally even in gardens inside the city.

Phenology: blooms all year.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Epidendrum orthocaula* Schltr. (1921)**

Figure 3E

Material examined. ECUADOR – PICHINCHA • Rumipamba Creek; 00°09'42"S, 078°31'19"W; 3000 m alt.; 20.I.2021; Luis Baquero & Martín Carrera 17 leg.; QCNE 269854.

Identification. Large to giant terrestrial orchid. Rhizome very short rhizome, erect. Stems straight, with linear-lanceolate to lanceolate-ligulate, rigid leaves. Leaves tapering to a sharp point. Inflorescence terminal, 15–25 cm long, with numerous densely packed, downward-curving branches. Flowers small, yellow (Dodson 2001).

Remarks. Abundance: rare.

Habit and ecology: on mud and vertical soil without rocks and without the presence of invasive species.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Epidendrum porphyreum* Lindl. (1841)**

Figure 3G

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 28.II.2019; Luis Baquero & Martín Carrera 19 leg.; QCNE 269836.

Identification. Medium-sized to large epiphyte or terrestrial orchid. Stems slender, cane-like, surrounded by leafy sheaths arranged in two opposite rows. Leaves linear, thin, and acute, clasping at base. Inflorescence terminal, arching, up to 12.5 cm long, racemose and branched. Flowers pendulous, purple with white (Dodson and Dodson 1982).

Remarks. Abundance: rare.

Habit and ecology: on several species of trees and always close to main river.

Phenology: blooms in February.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Malaxidinae Benth. & Hook. f.

***Malaxis andicola* (Ridl.) Kuntze (1891)**

Figure 3H

Material examined. ECUADOR – PICHINCHA • Atacazo Creek; 00°19'13"S, 078°34'45"W; 3100 m alt.; 24.I.2020; Luis Baquero & Martín Carrera 20 leg.; QCNE 269835.

Identification. Small terrestrial orchid. Pseudobulbs clustered, pear-shaped, surrounded by overlapping sheaths. Uppermost sheath bears leaves. Leaves in opposite pairs, ovate, with evident veins, tapering into elongate, petiolate bases. Inflorescences erect, apical, up to 8 cm long, arranged in a subumbellate form. Flowers green-yellow (Dodson 2002).

Remarks. Abundance: frequent.
 Other localities: Pita River and San Carlos Creek.
 Habit and ecology: on mud, mainly near *Blechnum* spp. ferns and *Eucalyptus* spp. trees.
 Phenology: blooms in January.
 Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Oncidiinae Benth.

***Caucaea dodsoniana* Szlach. & Kolan. (2015)**

Figure 3K

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 13.VII.2018; Luis Baquero & Martín Carrera 23 leg.; QCNE 269832.

Identification. Epiphytic orchid. Pseudobulbs ovoid to fusiform, each bearing two coriaceous leaves. Leaves elliptical to oblong-lanceolate, with a prominent midvein. Inflorescences erect, emerging from base of pseudobulb. Flowers fragrant, typically pink, occasionally marked with reddish-brown on sepals and petals (Szlachetko and Kolanowska 2015).

Remarks. Abundance: abundant.
 Other localities: Ilaló Creek and Rumipamba Creek.
 Habit and ecology: in humid forests with only native vegetation; commonly seen growing on *Miconia* spp. and *Oreopanax* spp. trees.
 Phenology: blooms in July.
 Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Cyrtochilum angustatum* (Lindl.) Dalström (2001)**

Figure 3L

Material examined. ECUADOR – PICHINCHA • Rumipamba Creek; 00°09'42"S, 078°31'19"W; 3000 m alt.; 07.I.2019; Luis Baquero & Martín Carrera 24 leg.; QCNE 269831.

Identification. Medium-sized epiphytic orchid. Pseudobulbs egg-shaped, slightly laterally compressed. Leaves 1–2, erect, spreading, acute, lanceolate. Inflorescence erect, to 55 cm long, arising through axil of an upper leaf. Flowers 5–6 on each 12.5–15.0 cm long branch, brown-yellow (Dodson and Luer 2010).

Remarks. Abundance: rare.
 Habit and ecology: on the cortex of *Oreopanax* spp. and other tree species.
 Phenology: blooms in January.
 Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.
 Subtribe Pleurothallidinae Lindl. Ex G. Don.

***Lepanthes effusa* Schltr. (1915)**

Figure 4C

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 11.II.2020; Luis Baquero & Martín Carrera 27 leg.; QCNE 269828.

Identification. Minature epiphytic orchid, with erect, slender ramicauls surrounded by 5–8 lepanthiform sheaths. Leaf single, apical, coriaceous, often purple, elliptical, obtuse, and cuneate at base into a petiolate structure. Inflorescence slender, loose, flexuous, 23–27 cm long, including a 1–5 cm peduncle. Flowers yellow-red (Luer 1996).

Remarks. Abundance: rare.
 Habit and ecology: on mossy bark of several tree species, including *Miconia* spp.; near water streams.
 Phenology: blooms in February.
 Conservation status: IUCN Red List: Least Concern.

***Pleurothallis quitu-cara* Carrera & Baquero (2018)**

Figure 4F

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 13.IV.2018; Luis Baquero & Martín Carrera 30 leg.; QCNE 269828.

Identification. Medium-sized epiphytic orchid with sturdy, glandular ramicauls, either hanging or horizontally extending. Leaf single, apical, horizontal to hanging, leathery, oblong and with slightly wavy margins; base of leaf nearly sessile, heart-shaped to deeply heart-shaped. Peduncles 10–12 mm, subtended by a spathe, simultaneously with 1–4 red or yellow flowers (Carrera et al. 2018).

Remarks. Abundance: rare.
 Habit and ecology: on trees like *Miconia* spp. and *Boehmeria* spp.; always near streams.

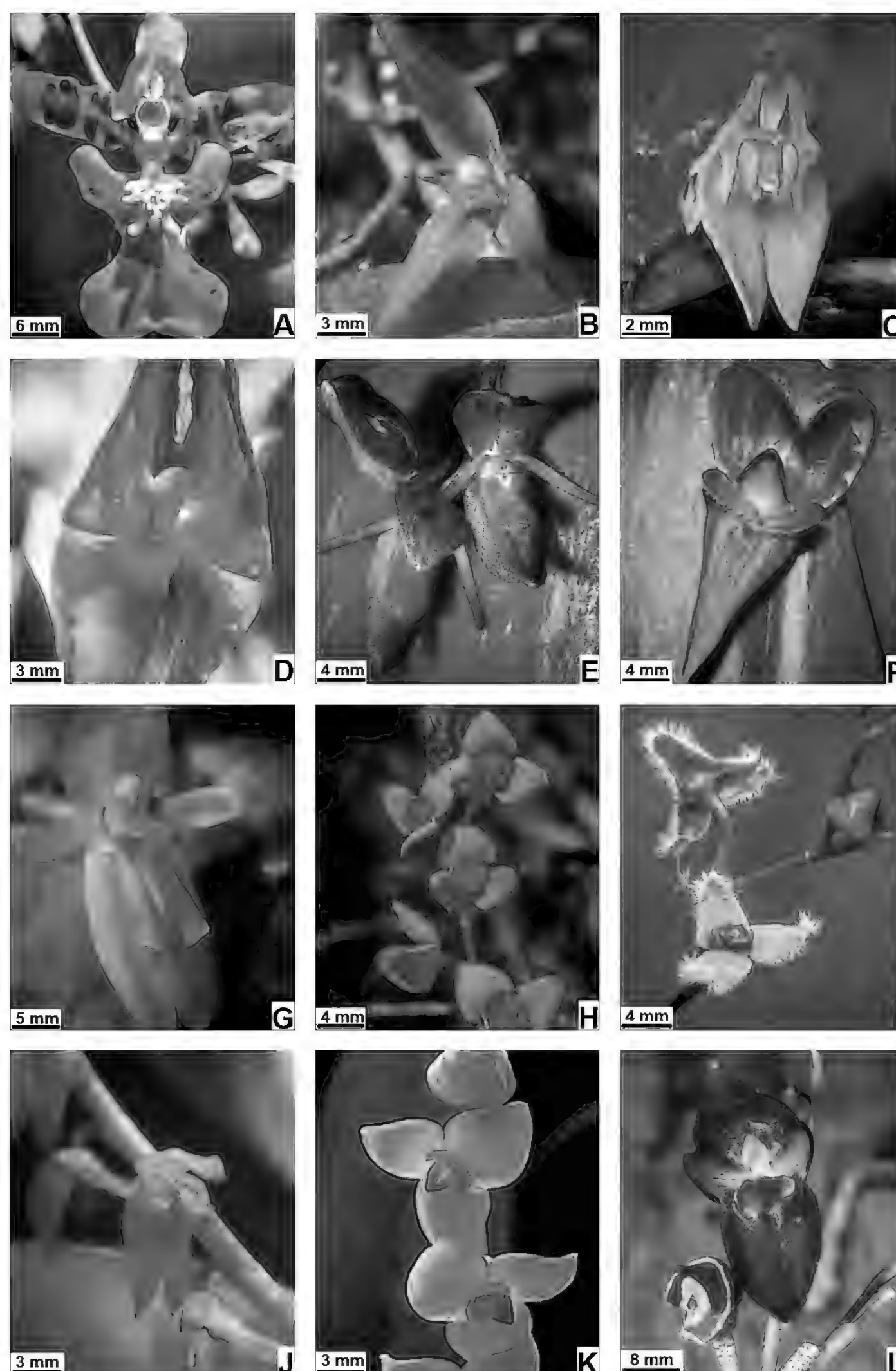


Figure 4. Orchids of Quito. **A.** *Oncidium pentadactylon* Lindl. **B.** *Anathallis lasioglossa* (Schltr.) Luer. **C.** *Lepanthes effusa* Schltr. **D.** *Lepanthes elegantula* Schltr. **E.** *Pleurothallis bivalvis* Lindl. **F.** *Pleurothallis quitu-cara* Carrera & Baquero. **G.** *Pleurothallopsis tubulosa* (Lindl.) Pridgeon & M.W. Chase. **H.** *Stelis argentata* Lindl. **I.** *Stelis flexuosa* Kraenzl. **J.** *Stelis pulchella* Kunth. **K.** *Stelis pusilla* Kunth. **L.** *Stelis restrepioides* (Lindl.) Pridgeon & M.W. Chase.

Phenology: blooms in April.

Conservation status: IUCN Red List: Not Evaluated.

***Pleurothallopsis tubulosa* (Lindl.) Pridgeon & M.W. Chase (2001)**

Figure 4G

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 06.XI.2019; Luis Baquero & Martín Carrera 31 leg.; QCNE 269855.

Identification. Small epiphytic orchid, with erect ramicauls surrounded by 4–8 brown, imbricated, ribbed, tubular sheaths. Leaf single, apical, erect, leathery, ovate, with acute or subacute to obtuse apex and a cuneate base forming a petiole. Flowers solitary, yellow, blooming in succession, emerging from a cluster of 3–6 mm-long peduncles (Luer 1994).

Remarks. Abundance: rare.

Habit and ecology: on bark of several tree species and on mossy vertical rocks.

Phenology: blooms in November.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Stelis argentata* Lindl. (1842)**

Figure 4H

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 18.I.2018; Luis Baquero & Martín Carrera 32 leg.; QCNE 269858.

Identification. Miniature epiphytic orchid, with clustered, lightly flattened ramicauls enveloped by a large, subinflated, tubular, scarious sheath and a single, apical, oblong, coriaceous leaf. Leaf tapers to cuneate petiole and slightly tridentate at apex. Inflorescence erect, 10 cm long, racemose, with several to many red or yellow flowers (Renner et al. 1990).

Remarks. Abundance: frequent.

Other localities: Rumipamba creek and Pita River.

Habit and ecology: mainly on rocks with moss, bark of several tree species, and on vertical soil.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Stelis flexuosa* Kraenzl. (1843)**

Figure 4I

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 06.XII.2019; Luis Baquero & Martín Carrera 33 leg.; QCNE 269857.

Identification. Miniature terrestrial or lithophytic orchid, with a very slender stem basally enveloped by 2–3 tubular sheaths. Leaf single, apical, oblanceolate to narrowly obovate, marginate, gradually narrowing into a short petiole. Inflorescence racemose, 3–9 cm long, suberect to arcuate, filiform, fractiflex. Flowers several to many, red (Schweinfurth 1958).

Remarks. Abundance: rare.

Habit and ecology: on various tree species but always close to rivers with small waterfalls.

Phenology: blooms in December.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Stelis pulchella* Kunth (1816)**

Figure 4J

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 15.XI.2018; Luis Baquero & Martín Carrera 34 leg.; QCNE 269837.

Identification. Medium-sized, densely caespitose epiphytic orchid, with slender, erect, fasciculate ramicauls. Leaf single, apical, erect, coriaceous, narrowly elliptical. Inflorescence 10–18 cm long, racemose, secund, densely and simultaneously many-flowered. Flowers yellow (Luer 1998).

Remarks. Abundance: abundant.

Other localities: Parque Metropolitano del Sur, Machangara River, Nayón Creek, Chiche River, Pita River, San Antonio de Pichincha, and Ilaló Creek.

Habit and ecology: in native ecosystems, but also along heavily polluted creeks and urban roads; on various tree species, on rocks and even concrete; growing near *Epidendrum jamesionis* and *Elleanthus sodiroi*.

Phenology: blooms in November.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Stelis pusilla* Kunth (1816)**

Figure 4K

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 15.XI.2018; Luis Baquero & Martín Carrera 35 leg.; QCNE 269838.

Identification. Miniature orchid, with caespitose to ascending epiphyte with fasciculate, erect, slender ramicauls. Leaf single, apical, erect, coriaceous, lanceolate, obtuse, gradually narrowing into petiolate base. Inflorescence erect to suberect, arising from an annulus below apex of ramicaul. Flowers mainly yellow (Dodson and Gentry 1978).

Remarks. Abundance: rare.

Habit and ecology: on wet, mossy rocks near *Stelis pulchella*.

Phenology: blooms in November.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Stelis restrepioides* (Lindl.) Pridgeon & M. W. Chase (2001)**

Figure 4L

Material examined. ECUADOR – PICHINCHA • San Antonio de Pichincha; 00°00'40"N, 078°27'21"W; 2700 m alt.; 21.V.2021; Luis Baquero & Martín Carrera 36 leg.; QCNE 269841.

Identification. Medium-sized, densely caespitose epiphyte or terrestrial orchid. Rhizome short. Ramicaul elongate, often pendent, basally enveloped by four elongate, tubular sheaths. Leaf single, erect, apical, elliptical, thick. Inflorescences apical, several at once, arising from a spathe at base of leaf. Flowers several, dark red with white marks (Luer 1994).

Remarks. Abundance: rare.

Habit and ecology: on rocks near *Stelis pulchella* and *Epidendrum jamiesonis*.

Phenology: blooms in May.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Spiranthinae Lindl.

***Cyclopogon peruvianus* (C. Presl) Schltr. (1920)**

Figure 5A

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 07.VII.2018; Luis Baquero & Martín Carrera 37 leg.; QCNE 269840.

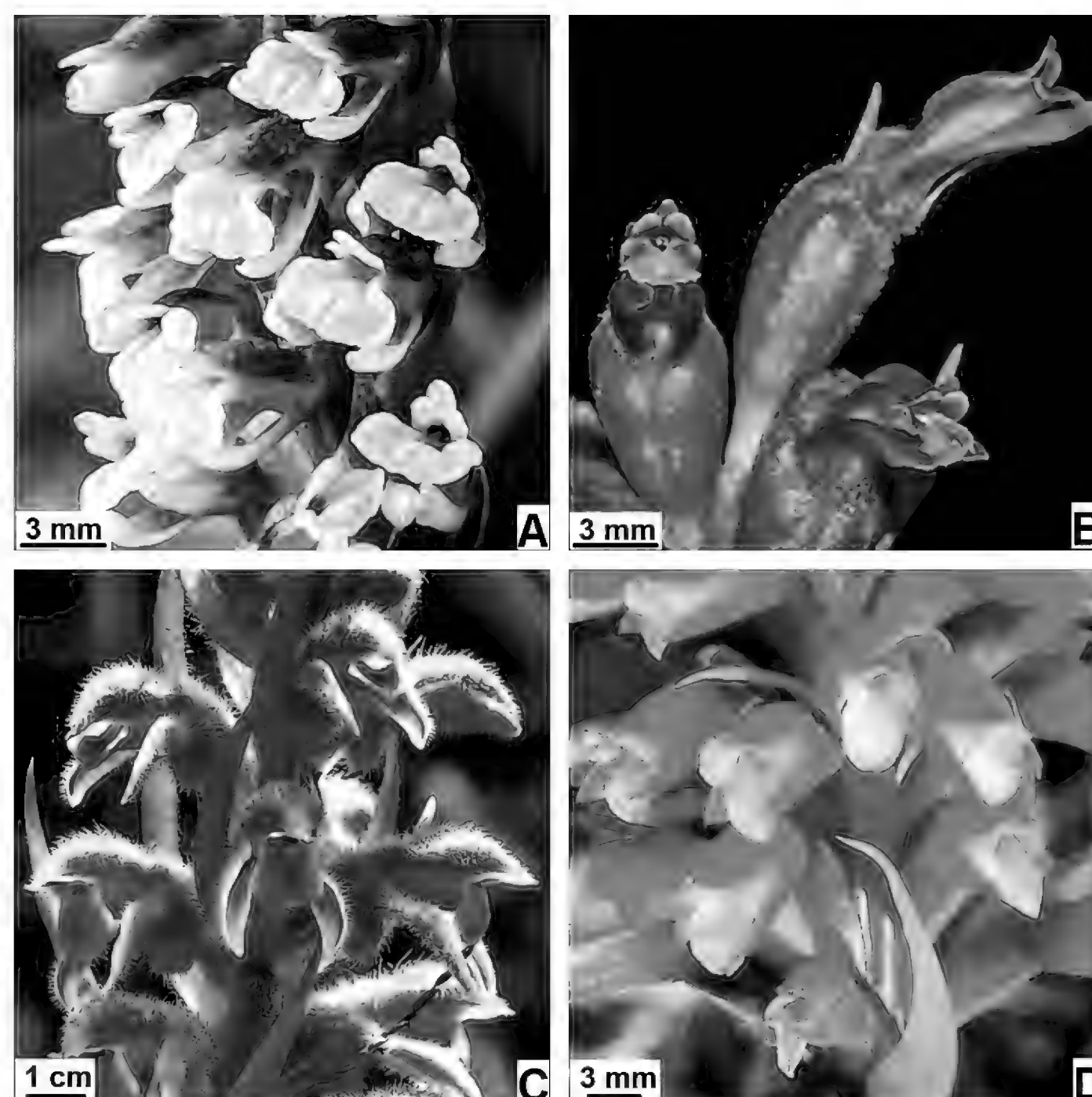
Identification. Small, terrestrial orchid, with narrowly elliptical, acute leaves, gradually narrowing into a channeled, elongate, petiolate base. Inflorescence erect, up to 25 cm long, bearing several to many white flowers (Dodson and Escobar 1993).

Remarks. Abundance: abundant.

Other localities: Nayón Creek, San Roque Creek, Rumipamba Creek, Parque Guápulo, Pita River, Machángara River, Lumbisí Creek, Parque Metropolitano Sur, Ilaló Creek and San Antonio de Pichincha.

Habit and ecology: in dry areas and in native forest, but also in *Eucalyptus* spp. forests or even heavily polluted areas and gardens.

Figure 5. Orchids of Quito. **A.** *Cyclopogon peruvianus* (C. Presl) Schltr. **B.** *Cyclopogon pululahuanus* Dodson. **C.** *Pelexia hirta* Schltr. **D.** *Stenorrhynchos speciosum* (Jacq.) Rich. ex Spreng.



Phenology: blooms in July.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Stenorrhynchos speciosum* (Jacq.) Rich. ex Spreng. (1817)**

Figure 5D

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 23.V.2019; Luis Baquero & Martín Carrera 40 leg.; QCNE 269842.

Identification. Medium-sized terrestrial orchid with a rosette of 6–12 elliptical, petiolate, dark green, and white-variegated, persistent leaves. Inflorescence terminal, erect, racemose, 20–90 cm long, with lanceolate, acuminate, red bracts, carrying long-lasting, spirally arranged red flowers at apex (Dressler 2003).

Remarks. Abundance: rare.

Habit and ecology: on moist, rocky ground near *Blechnum* spp. ferns.

Phenology: blooms in May.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Orchid species newly reported from the study area

Subtribe Cranichidinae Lindl.

***Ponthieva pseudoracemosa* Garay (1978)**

Figure 2F

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'57"S, 078°24'41"W; 3000 m alt.; 21.II.2019; Luis Baquero & Martín Carrera 06 leg.; QCNE 269848.

Identification. Small to medium-sized terrestrial orchid. Leaves 2–5, basal, elliptical to oblong, acute to obtuse, gradually tapering into a petiolate base. Stem stout, erect, glabrous, becoming pubescent towards top, up to 40 cm long. Rachis up to 12 cm long. Flowers several, white (Garay 1978).

Remarks. Abundance: rare.

Habit and ecology: on mud at base of rocks near streams.

Phenology: blooms in April.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Laeliinae Benth.

***Epidendrum angeloglossum* Hágsater & Dodson (2009)**

Figure 2L

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 05.XI.2020; Luis Baquero & Martín Carrera 12 leg.; QCNE 269856.

Identification. Medium-sized terrestrial orchid. Stems cane-like, erect, branching in mature plants. Leaves coriaceous, oblong-lanceolate, subobtuse, with entire margins on main stem. Inflorescence terminal, erect, racemose, with a short, thin peduncle and triangular bracts. Inflorescence with successive, apple-green flowers (Hágsater 2009).

Remarks. Abundance: rare.

Habit and ecology: on mossy rocks near *Elleanthus petrogeiton*, *Stelis pulchella*, and *Epidendrum jamiesonis*.

Phenology: blooms in November.

Conservation status: IUCN Red List: Data Deficient.

***Epidendrum penlandii* L. O. Williams (1940)**

Figure 3F

Material examined. ECUADOR – PICHINCHA • Pifo Creek; 00°12'31"S, 078°18'40"W; 3000 m alt.; 18.II.2021; Luis Baquero & Martín Carrera 18 leg.; QCNE 269853.

Identification. Small-sized lithophytic orchid. Stems caespitose, cylindrical to fusiform. Leaves ascending, coriaceous, lanceolate to elliptical-lanceolate, acute, cuneate at base. Inflorescence terminal, erect to suberect, becoming arcuate to pendent, loosely racemose. Inflorescence 13 cm long, with a peduncle of cream-colored flowers (Williams 1940).

Remarks. Abundance: rare.

Habit and ecology: in humid areas on various tree species in open areas close to small streams.

Phenology: blooms in February.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Maxillariinae Benth.

***Maxillaria aggregata* Lindl. (1832)**

Figure 3I

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 11.XI.2021; Luis Baquero & Martín Carrera 21 leg.; QCNE 269834.

Identification. Small to medium-sized epiphytic or terrestrial orchid. Rhizome creeping, elongate, producing ovoid pseudobulbs enveloped by numerous, stiff, linear-lanceolate, acute, blue-green leaves. Many axillary, fasciculate, sessile, single-flowered pink inflorescences (Dodson and Vásquez 1989).

Remarks. Abundance: rare.

Habit and ecology: on rocks without moss and near *Elleanthus petrogeiton*. We saw several common bees (*Apis* sp.) interested in the flowers and visiting them multiple times.

Phenology: Blooms in November.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

***Maxillaria longibracteata* Rchb. f. (1863)**

Figure 3J

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 19.II.2020; Luis Baquero & Martín Carrera 22 leg.; QCNE 269833.

Identification. Medium-sized epiphytic orchid, with small, clustered, ovoid or ellipsoid pseudobulbs. Leaves 1–2, linear to lanceolate, leathery, 20 cm long and 2 cm wide. Leaves typically dark green, with a prominent central vein. Inflorescences emerging from base of pseudobulbs, usually solitary, with a single yellow flower (Atwood 2003).

Remarks. Abundance: rare.

Habit and ecology: on a cliff with mainly native vegetation, but the creek was surrounded by *Eucalyptus* spp.

Phenology: blooms in January.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Oncidiinae Benth.

***Oncidium pentadactylon* Lindl. (1845)**

Figure 4A

Material examined. ECUADOR – PICHINCHA • El Ejido Park; 00°12'15"S, 078°29'56"W; 2800 m alt.; 23.IV.2018; Luis Baquero & Martín Carrera 25 leg.; QCNE 269830.

Identification. Medium-sized epiphytic orchid. Pseudobulbs smooth, elliptical, laterally compressed, roundly apiculate. Leaves 2, apical, oblong-lanceolate and conduplicate below into a short, petiole-like base. Inflorescence axillary, erect, many-flowered, paniculate, up to 90 cm long. Flowers yellow with brown marks (Hokche et al. 2008).

Remarks. Abundance: frequent.

Other localities: Pita River.

Habit and ecology: on upper surface of the stem of a *Parajubaea cocoides* Burret palm in Parque El Ejido (urban area). This species normally grows on various tree species in humid areas, where it can be seen together with *Stelis argentata* and *Caucaea dodsoniana*.

Phenology: blooms in April–June.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Pleurothallidinae Lindl. Ex G. Don.

***Anathallis lasioglossa* (Schltr.) Luer (2009)**

Figure 4B

Material examined. ECUADOR – PICHINCHA • Ilaló Creek; 00°15'28"S, 078°25'37"W; 2900 m alt.; 28.II.2021; Luis Baquero & Martín Carrera 26 leg.; QCNE 269829.

Identification. Miniature epiphytic orchid. Ramicauls ascending, enveloped by 2 tubular sheaths. Leaf single, apical, erect, coriaceous, narrowly obovate, with an acute to subacute apex. Inflorescence Loose, flexuous, distichous, about 5.5 cm long. Flowers dark red and yellow (Pridgeon and Chase 2001).

Remarks. Abundance: rare.

Habit and ecology: in native forest growing on various tree species and near *Epidendrum brevivenium*.

Phenology: blooms in February.

Conservation status: CITES: Appendix II; IUCN Red List: Vulnerable.

***Lepanthes elegantula* Schltr. (1915)**

Figure 4D

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 09.II.2020; Luis Baquero & Martín Carrera 28 leg.; QCNE 269827.

Identification. Miniature epiphytic orchid. Ramicauls erect, slender, enveloped at base by 5–8 minutely scabrous, lepanthiform sheaths. Leaf single, apical, erect, coriaceous, elliptical, with an obtuse apex and a cuneate base. Inflorescence forming loose, strict, 5–6 cm long racemose inflorescence. Inflorescence forming a loose, strict, 5–6 cm long racemose. Flowers dark red (Luer 1996).

Remarks. Abundance: rare.

Habit and ecology: on small branches of various tree species; always close to small streams. Growing on a branch with *Lepanthes effusa*.

Phenology: blooms in February.

Conservation status: IUCN Red List: Near Threatened.

***Pleurothallis bivalvis* Lindl. (1846)**

Figure 4E

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 09.XII.2018; Luis Baquero & Martín Carrera 29 leg.; QCNE 269825.

Identification. Small epiphytic and terrestrial orchid. Ramicaul single, erect, stout, supported by 2 tubular sheaths and bearing a single, cordate-elliptical leaf. Inflorescence successive, single, few-flowered, with flowers close to leaf base. Flowers red to yellow (Bogarín Chaves et al. 2014).

Remarks. Abundance: frequent.

Other localities: Rumipamba Creek.

Habit and ecology: in humid areas, growing on various tree species and on vertical soil.

Phenology: blooms in December.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Subtribe Spiranthinae Lindl.

***Cyclopogon pululahuanus* Dodson (1994)**

Figure 5B

Material examined. ECUADOR – PICHINCHA • Pita River; 00°22'56"S, 078°24'41"W; 3000 m alt.; 15.I.2019; Luis Baquero & Martín Carrera 38 leg.; QCNE 269839.

Identification. Small terrestrial orchid with a basal rosette of obliquely ovate to elliptical, acuminate leaves. Leaves light green on both sides. Inflorescence erect, characterized by 3–4 appressed, acuminate sheaths that decrease in size upwards. Inflorescence loosely many-flowered. Flowers white (Dodson 1994).

Remarks. Abundance: rare.

Habit and ecology: in humid areas and on mud with *Blechnum* spp. ferns. We found that *Cuscuta foetida* Kunth parasitizes this species.

Phenology: blooms in January.

Conservation status: IUCN Red List: Endangered.

***Pelexia hirta* Schltr. (1920)**

Figure 5C

Material examined. ECUADOR – PICHINCHA • Parque Metropolitano Guangüiltagua; 00°09'58"S, 078°27'54"W; 2800 m alt.; 13.VII.2020; Luis Baquero & Martín Carrera 39 leg.; QCNE 269844.

Remarks. Abundance: Rare.

Habit and ecology: In dry zones in *Eucalyptus* spp. forest and along edge of a dry creek without native vegetation.

Phenology: Blooms in July.

Conservation status: CITES: Appendix II; IUCN Red List: Not Evaluated.

Identification. Medium-sized terrestrial orchid. Leaves 2–4, basal, narrowly lanceolate to lanceolate-elliptical. Inflorescence erect, somewhat flexuous and puberulent, up to 60 cm in overall length. Rachis of inflorescence about 12.5 cm long, densely spicate above. Flowers greenish to yellowish (Garay 1978).

DISCUSSION

Apart from the records of the herbaria of Quito, we analysed records from the Missouri Botanical Garden's database (MOBOT), which gathers specimen data from other herbaria, including Aarhus University Herbarium (AAU), Harvard University Herbarium (HUH), the Herbarium of Natural History of Vienna (W), Herbario

de la Universidad Central del Ecuador (QAP), and others (TROPICOS 2015). During our field campaigns, we did not find 23 species for which herbarium records exist (Table 1). We suggest that these species may now be locally extinct due to destruction of native forests and creeks with urban growth (Morales 2008; EPMAPS 2011; Soto-Arenas et al. 2015). However, there is the possibility that these species may still persist in unsurveyed sites. We could not access several creeks because of safety concerns in high-crime neighbourhoods or because such locations are prone to natural disasters (Estacio and Jácome 2012). Without local escort or extra security provided by police, these sites are inaccessible. Exploration of these “problem” sites, or new sites that are hard to access due to steep cliffs or high tree canopy, could help us find the unaccounted for species; additional species, either new or unreported, could also be found (Carrera et al. 2018).

Our study documents 11 species for the first time from the urban area of the city of Quito. It is most likely that previous researchers overlooked these species. Species of *Stelis*, or *Lepanthes*, have similar morphologies or small flowers, and correct identification is challenging even with modern technology (Dressler 2005; Carrera et al. 2018). It is also possible that as the city grew, new roads facilitated access to previously remote and hard to access creeks and forests that were not reachable in the past; thus, we gained access to survey these creeks for the first time (WCS 2006; Marcantonio et al. 2013). A third possibility is that while most of the orchid species are vulnerable to climate change (Geppert et al. 2020), some species may benefit from it and expand their distribution and adapt to challenging urban environments (Evans et al. 2020; Kolanowska and Ruszkiewicz-Michalska 2023). For example, species such as *Altensteinia fimbriata*, which is not common in native ecosystems, is extremely common in invasive *Eucalyptus* spp. forests (Trujillo 2013; Carrera and Baquero 2024).

Despite the presence of highly tolerant species like *Epidendrum jamiesonis*, *Stelis pulchella*, and *Cyclopogon peruvianus*, which grow even in gardens (this study), several species are threatened. For example, we found only a single individual of *Maxillaria aggregata*, *Maxillaria longibracteata*, and *Pelexia hirta* in our entire study area. However, most species are not evaluated by the IUCN. More information is needed to properly assess them. Considering that there are one endangered species, one vulnerable species, and 52 species listed in CITES II, there is an urgent need for conservation efforts and management of the creeks of Quito (Walsh et al. 2005; Ramirez and Walteros-Rodríguez 2020). The diversity of orchid species along these creeks shows that these ecosystems are relatively healthy, and it is unfortunate that the city of Quito is still growing without proper planning (Akhalkatsi et al. 2014). These lack of urban planning not only affects the last remnants of natural ecosystems, but also the ecosystems services that these creeks provide, such as flash-flood prevention (Pinos and Timbe 2020).

Orchids are an essential part of the ecosystems in which they live and are valued by people for their aesthetics, which makes them effective in raising public awareness (Akhalkatsi et al. 2014; Estopinan et al. 2024). By emphasizing the importance of orchid conservation, we can conserve their ecosystems. We hope legislators and local authorities can use this information to develop a strategy for educating the public on the importance of conservation of Quito’s creeks.

Conservation actions would protect areas that offer unique ecosystems services, where not only orchids exist, but also threatened species of animals, fungi, other plants, including potential new species, which are struggling to avoid extinction (Akhalkatsi et al. 2014; Pinos and Timbe 2020; Santander et al. 2020).

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ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

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Author contribution

Conceptualization: MC and LB. Data curation: MC and LB. Formal analysis: MC and LB. Funding acquisition: MC Investigation: MC and LB. Methodology: MC and LB. Resources: MC and LB. Supervision: LB Project administration: MC and LB. Software: MC and LB. Validation: MC and LB. Visualization: MC and LB. Writing – original draft: MC and LB. Writing – review and editing: MC and LB.

Author ORCID iDs

Martín Carrera  <https://orcid.org/0000-0002-5189-0168>

Luis Baquero  <https://orcid.org/0000-0002-1444-5727>

Data availability

All data that support the findings of this study are available in the main text.

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